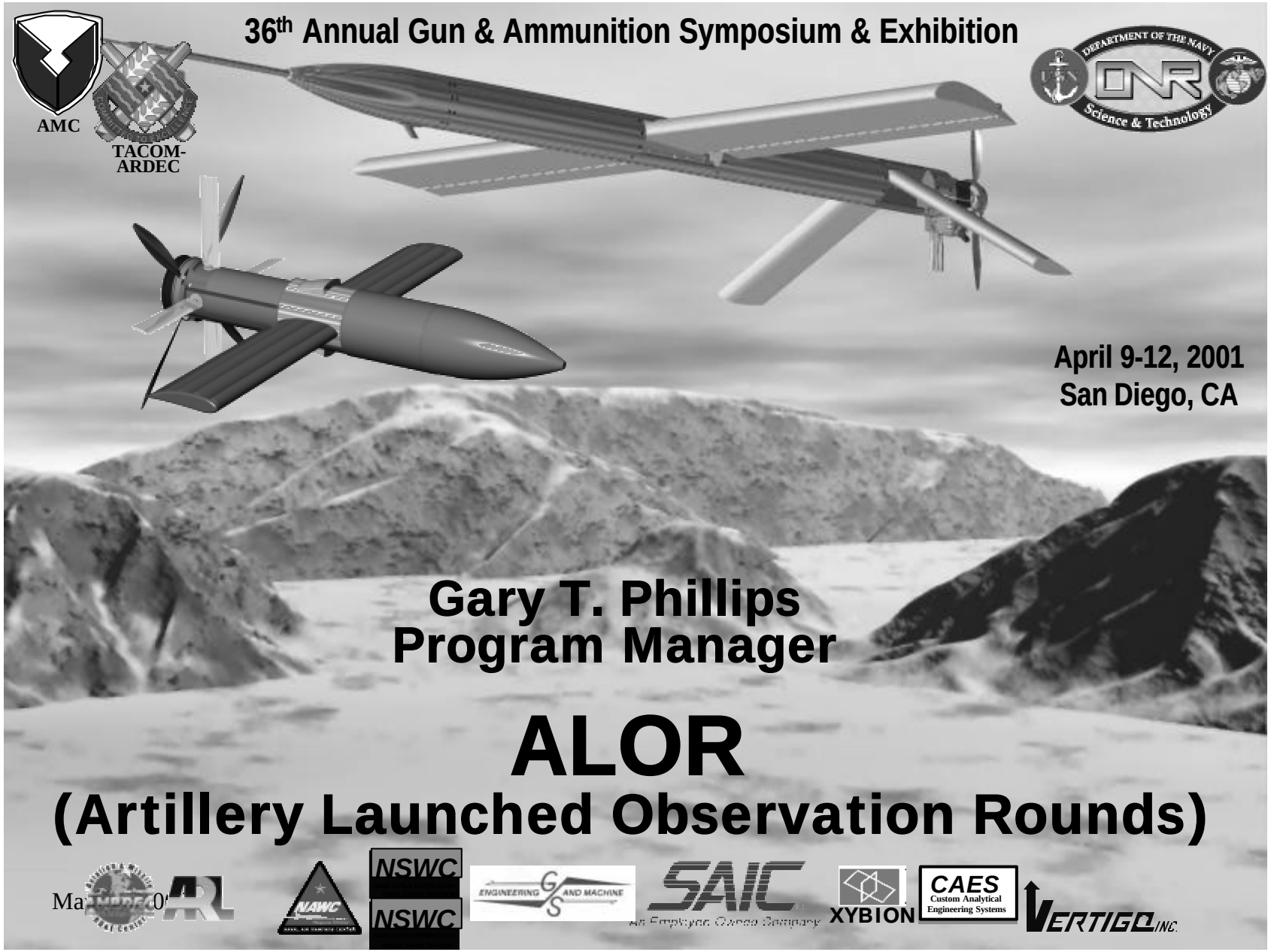
36th Annual Gun & Ammunition Symposium & Exhibition
AMC
TACOM-
ARDEC
ONR
Science & Technology
April 9-12, 2001
San Diego, CA
Gary T. Phillips
Program Manager
ALOR
(Artillery Launched Observation Rounds)
NSWC
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SAIC
XYBION
CAES
Custom Analytical
Engineering Systems
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Outline

- ALOR DTO & Related Programs
- Operation & Employment of ALOR
- Current ALOR Program Goals
- ALOR Vehicle Technologies
- ALOR Progress to Date

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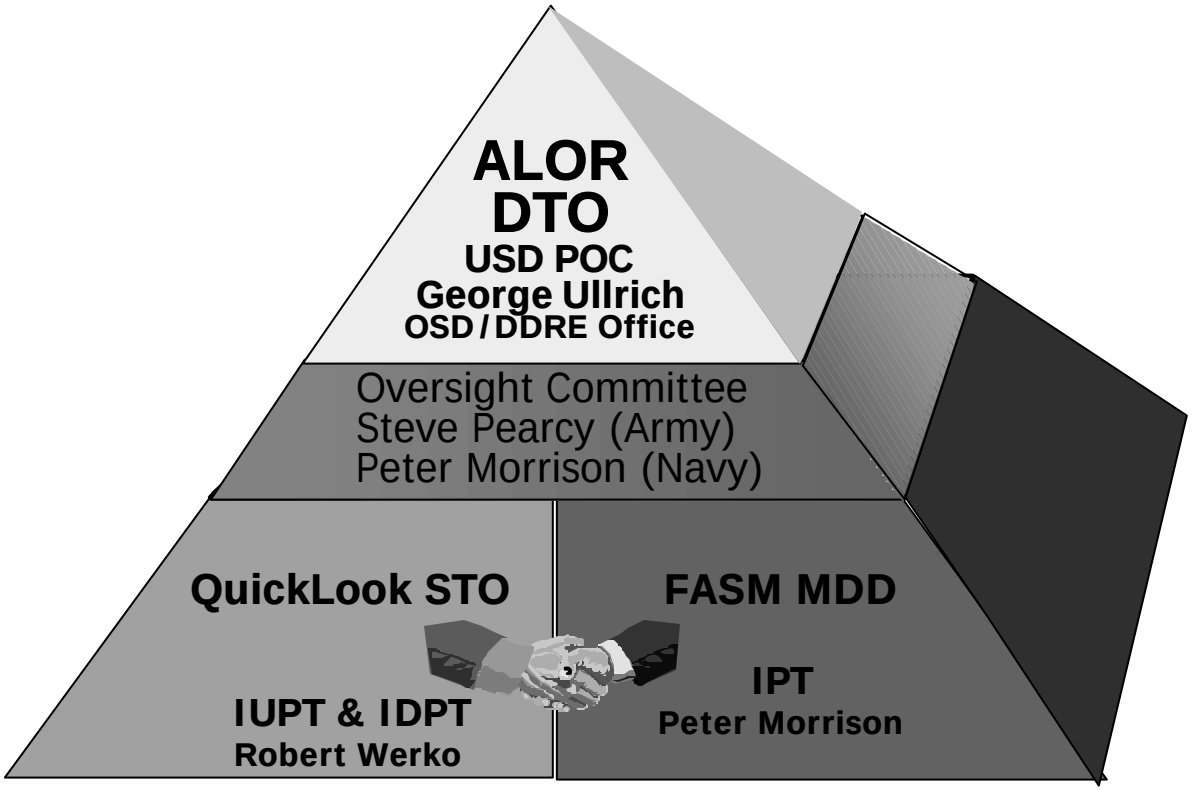
ALOR DTO



Combines FASM & QuickLook Munitions Development

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FASM/QuickLook Leverage Navy & Army Programs

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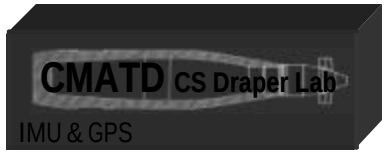

Navy SBIRs
Propulsion, Inflatables
Communications
Video Enhancements

Shared Technologies
Sensors
GN&C
Como Link
Wings
Propulsion

ALOR

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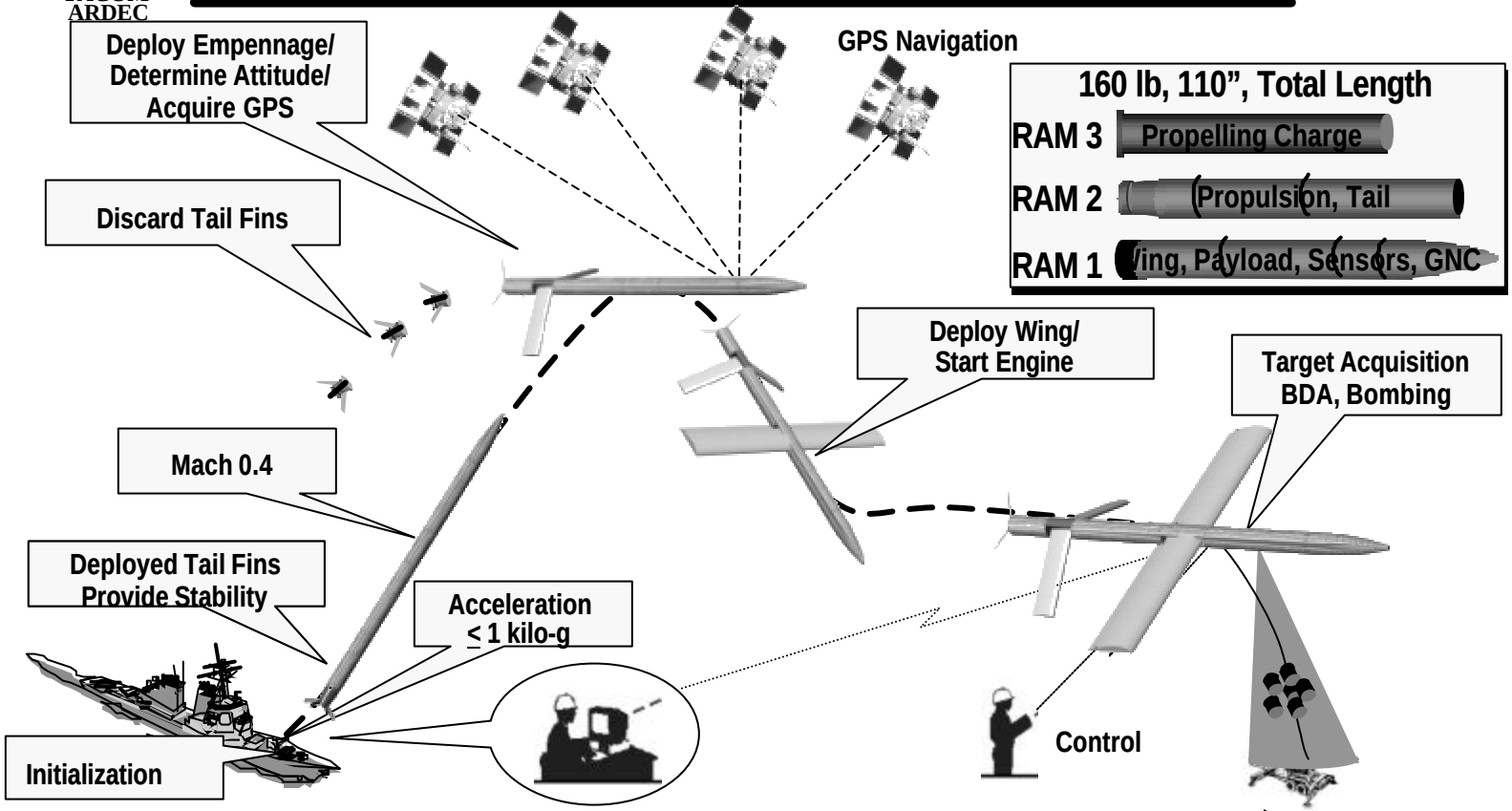
FASM Operation



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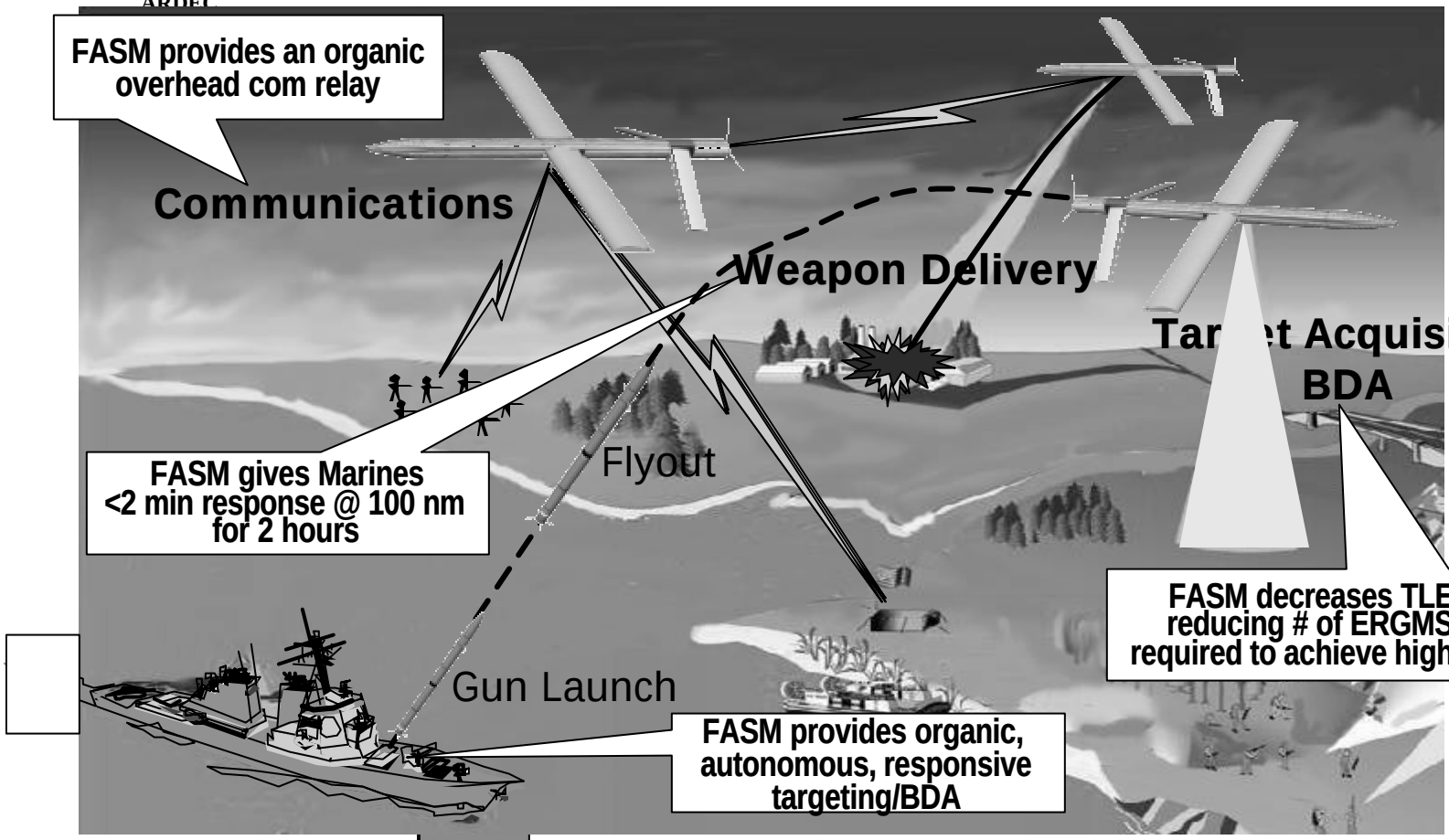
FASM Concept of Employment



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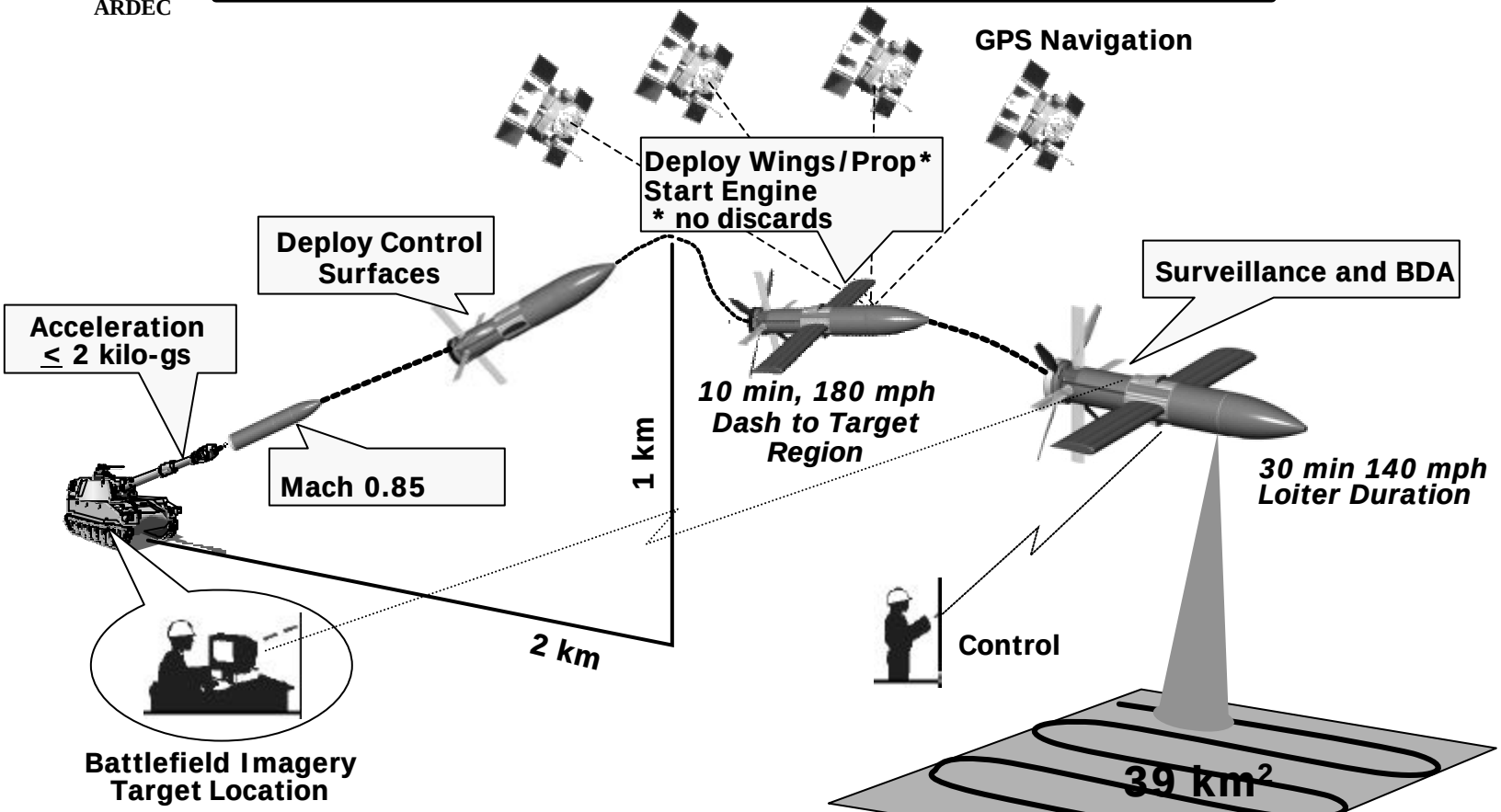
QuickLook Operation



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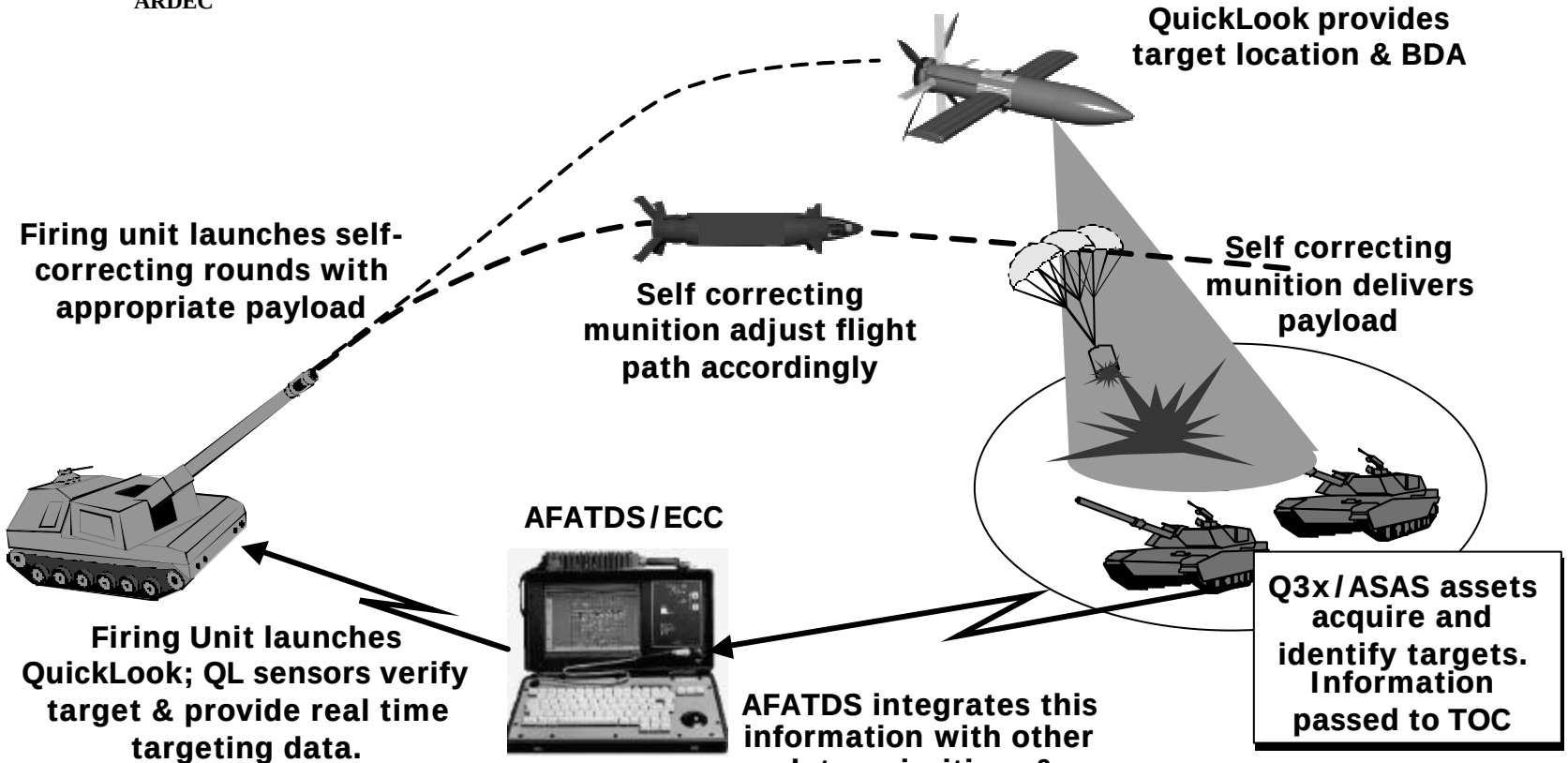
QuickLook Concept of Employment



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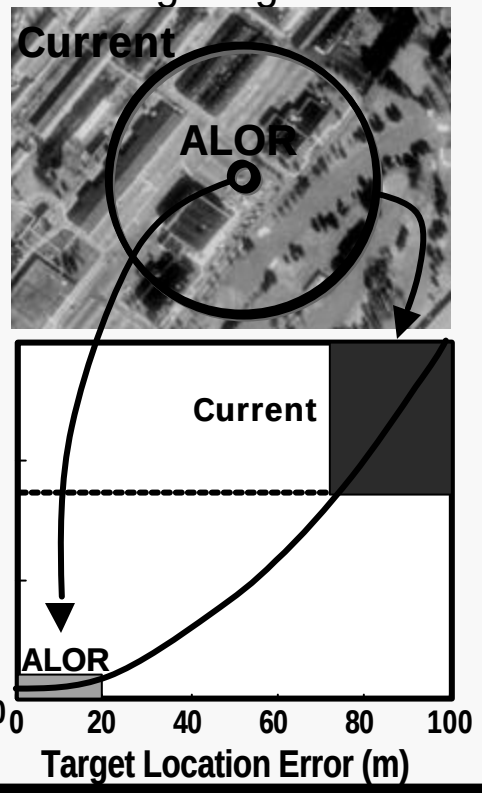
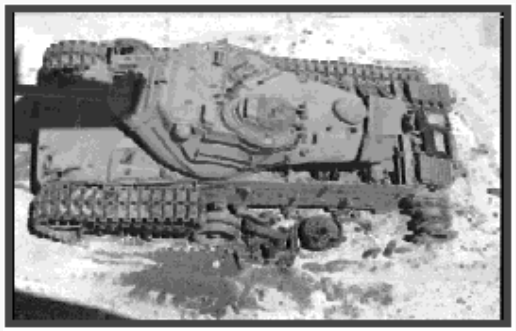
Projected Impact on Battle

Precision Targeting



Battle Damage Assessment



- **Debris**
- **Smoke**
- **Fire**

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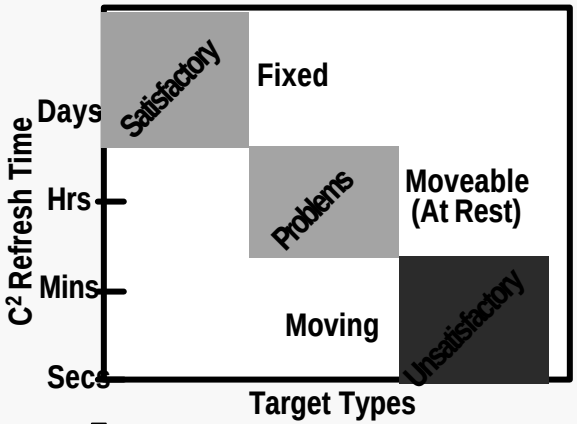
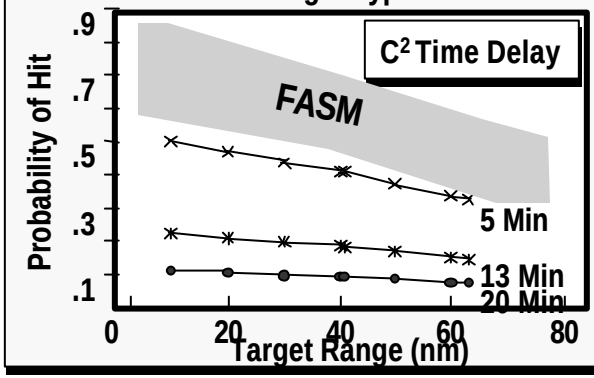
Projected Impact on Battle

Time Critical Strike





OMFTS

- Survey helicopter approach/ retirement routes
- Survey HLZ
- Suppression in area around HLZ
- Protection during embarkation

- Survey enemy approach routes
- Act as a communication link
- Provide Suppressive Fire
- Provide Protective Fire

- BDA
- Survey approach / retirement Routes
- Act as a communication link
- Provide Suppressive Fire
- Provide Protective Fire

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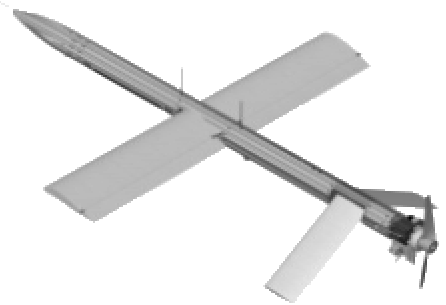
FASM Marine Defense Demonstration Program

The FASM MDD will demonstrate the following basic requirements:

- Ballistic configuration transition to stable cruise flight
- Cruise/Loiter endurance of more than 3 hours
- MIL tactical targeting using live imagery comm link
- Bomb drops with 5-m precision relative to airframe
- Battle damage assessment
- Autonomous flight with in-flight ground control redirect



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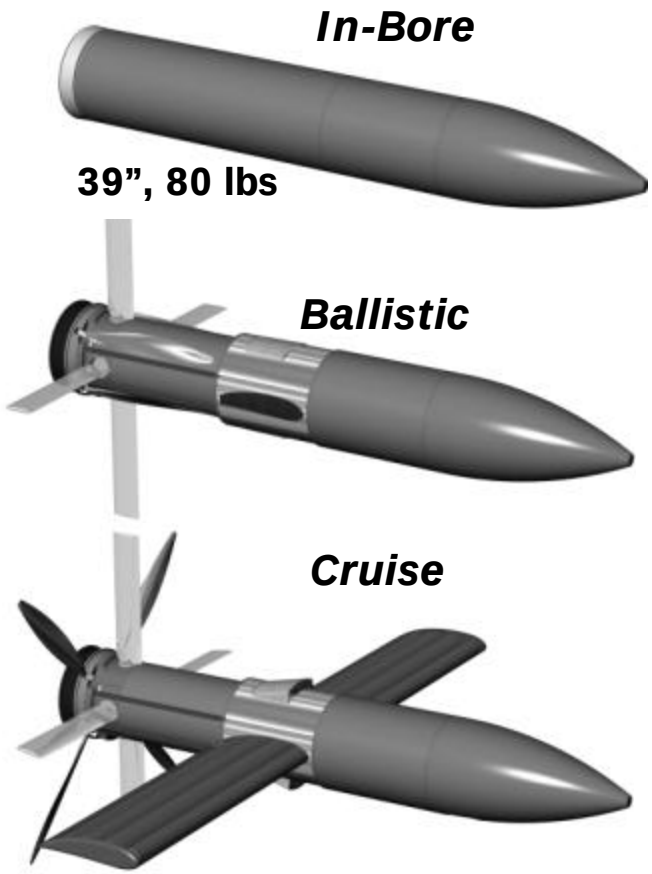
QuickLook STO Program



The QuickLook STO program will demonstrate the following as basic requirements:

- Transition from ballistic configuration to stable cruise flight.
- Loiter endurance of more than 30 minutes.
- Targeting with under 50-m CEP
- Battle damage assessment using live imagery communications linkage
- Autonomous flight with in-flight ground control redirect

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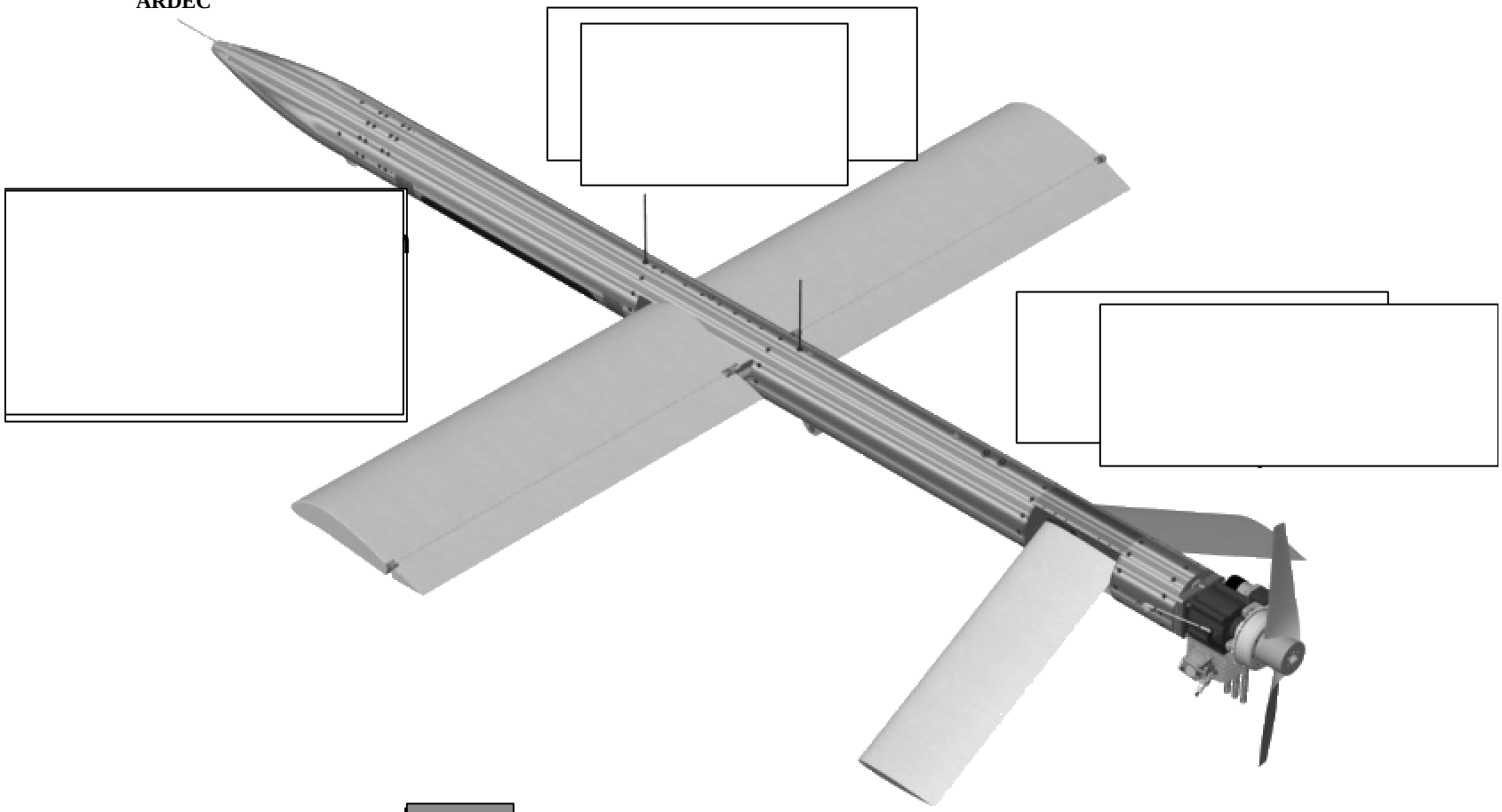
Vehicle Technologies



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Tech Base

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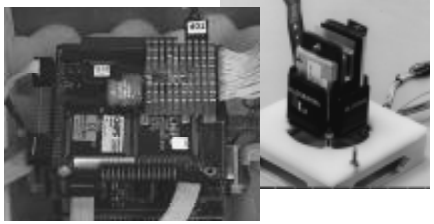
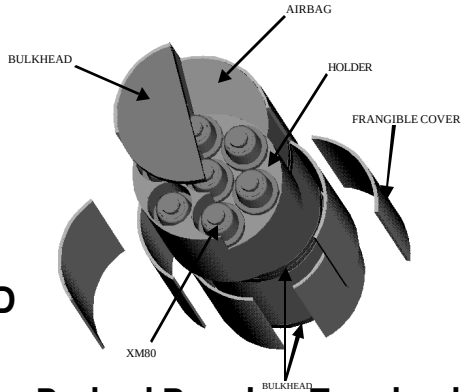
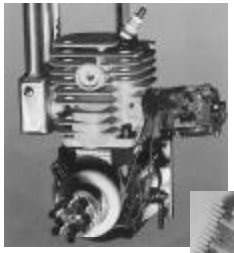


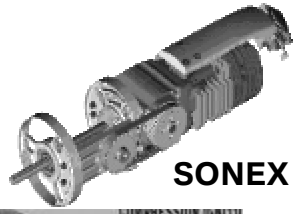
Flight Computer based on Vigilante
GNC relies on ERGM, XM982, CMATD



Payload Based on Tomahawk
109-D Dispenser



Brison

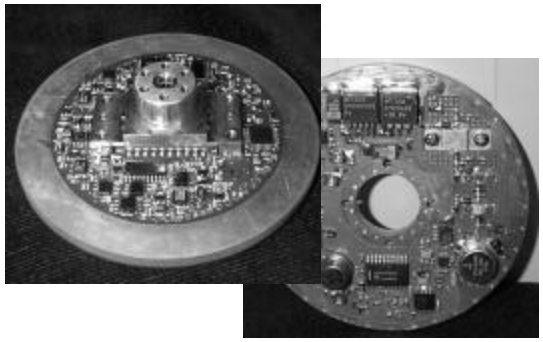


SONEX

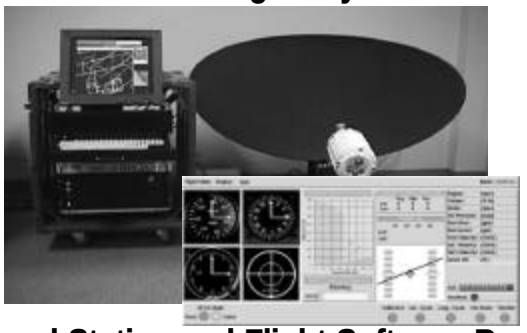
GSE

Propulsion Based on COTS, SBIR
& New Engine Systems

Inflatables based on GLOV SBIR



Gun Hardened Camera & Transmitter
Based On Air Force BDA Camera Unit



Ground Station and Flight Software Based
on Vigilante Autonomous Helicopter

Advanced Composites based on
Best Buy

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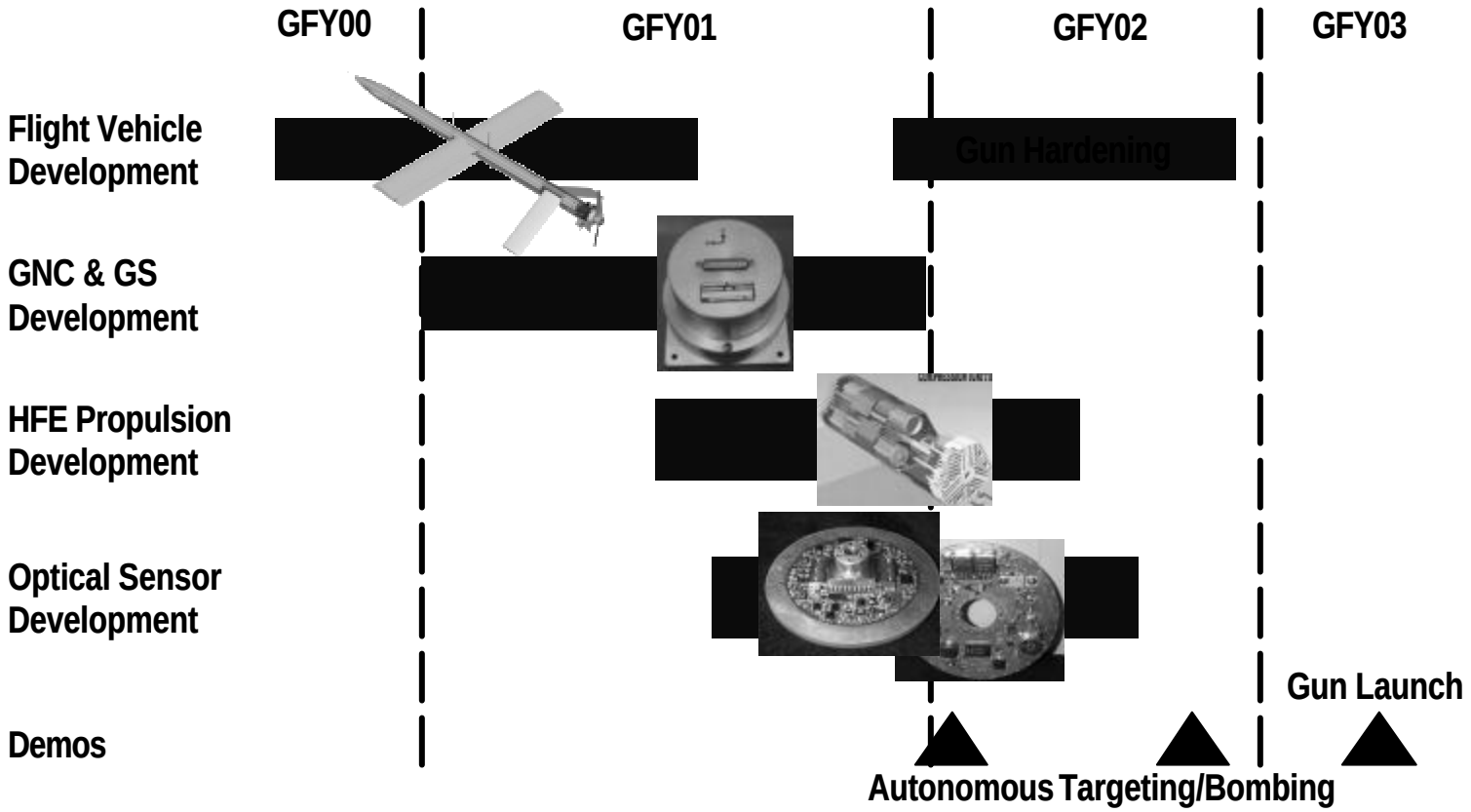
Schedule


GFY00
GFY01
GFY02
GFY03
Flight Vehicle Development
Gun Hardening
GNC & GS Development
HFE Propulsion Development
Optical Sensor Development
Gun Launch
Demos
Autonomous Targeting/Bombing

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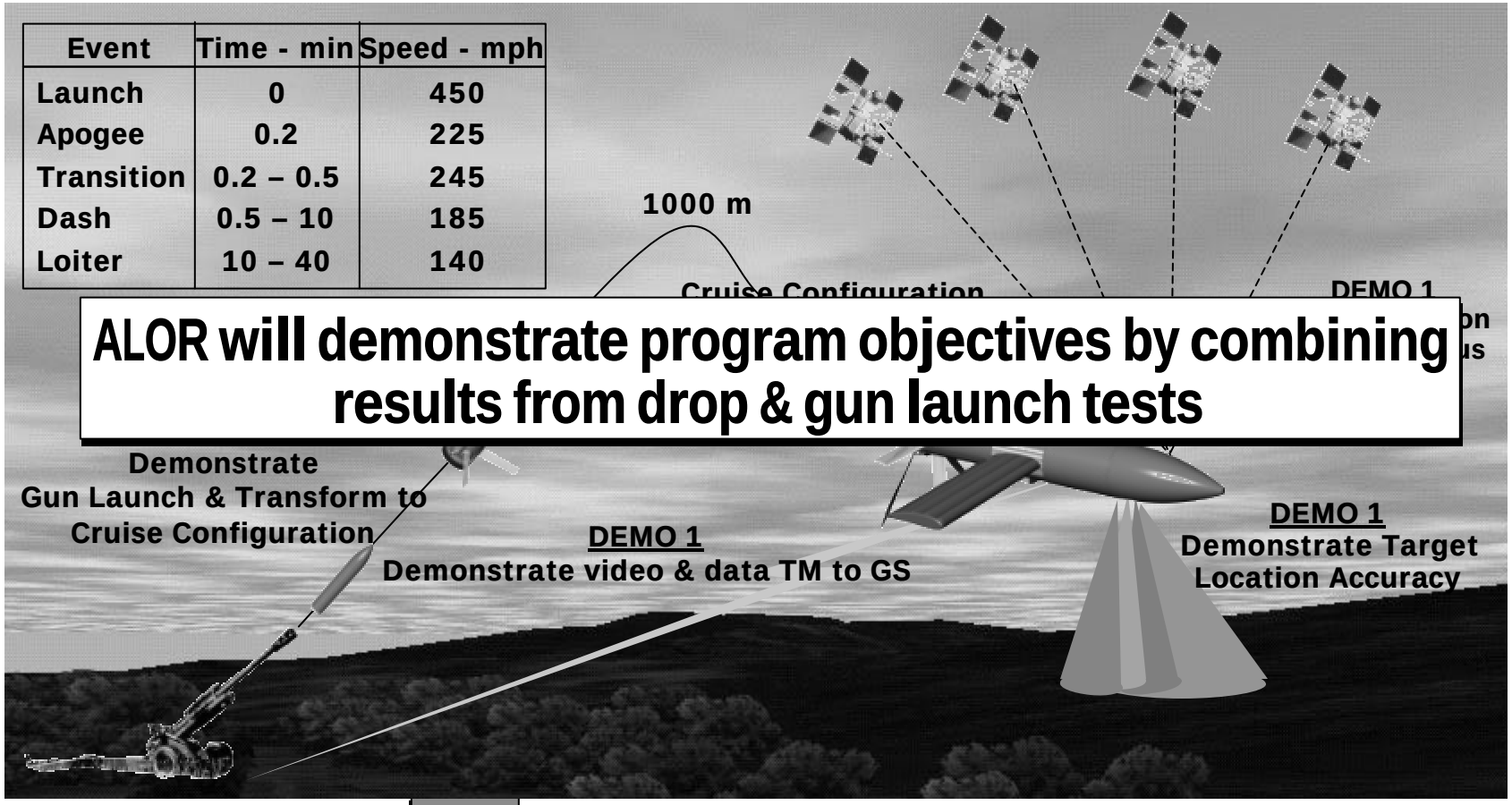
Program Demos

Event	Time - min	Speed - mph
Launch	0	450
Apogee	0.2	225
Transition	0.2 – 0.5	245
Dash	0.5 – 10	185
Loiter	10 – 40	140



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XYBION

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Strong Progress Since Program Start

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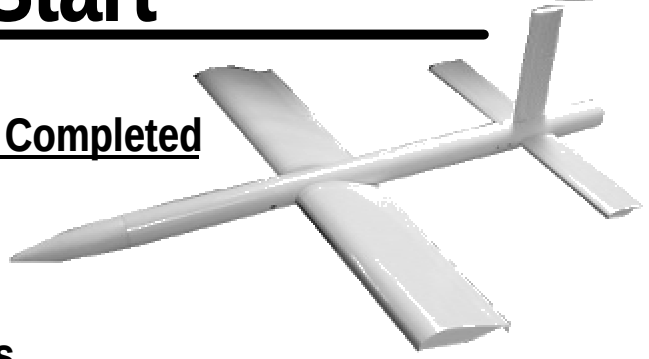
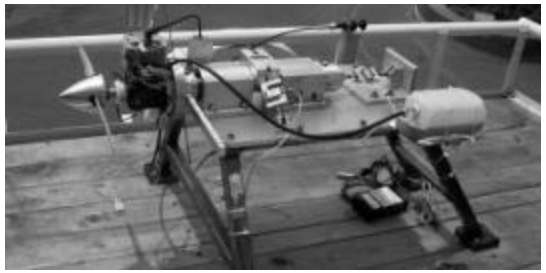
TACOM-ARDEC

DEPARTMENT OF THE NAVY ONR Science & Technology



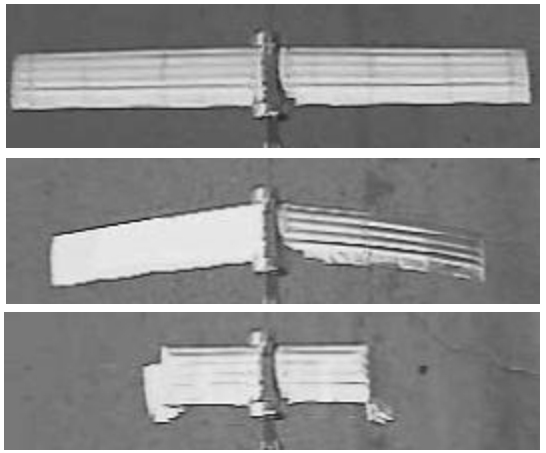
Full Scale, Non-Powered R/C Flight Tests Completed

- Stability and Maneuverability
- "Tail Sizing"
- Characterization complete June-00



Engine Tests

- COTS engine characterization complete September-00
- HFE axial engine bench top demo complete December-00



Wing Deployment Tests (GLOV SBIR)

- Successful deployment @ 80 mph
- Wing deploys symmetrically with minimal rebound
- Wing spar pressure: 150 psi

AMRDEC, ARL, NAWC, NSWC, NSWC, ENGINEERING AND MACHINE, SAIC Employee-Owned Company, XYBION, CAES Custom Analytical Engineering Systems, VERTIGO INC.

Strong Progress Since Program Start

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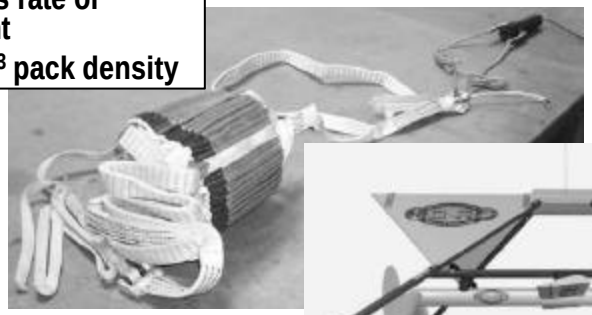
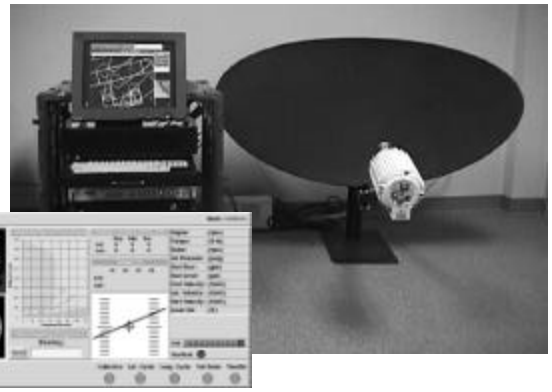
Parachute Specs
- 13.5 ft diameter
- 90% hemi
- 19.5 fps rate of descent
- 30 lb/ft^3 pack density



Rocket Deployed Parachute Recovery System
- Chute housed in payload section
- Flight Tested in December-00

Launch Cradle
- Helicopter tow
- Flight Tested in November-00

Flight Software/Hardware & Ground Station
- R/C flight software/hardware and diagnostics complete December-00
- Executive Flight software architecture defined and coding complete July-01
- Vigilante Ground Station System Mod complete April-01
- Integration of flight computer hardware complete May-01



AMRDEC ARL NAWC NSWC ENGINEERING GS AND MACHINE SAIC Employee-Owned Company XYBION CAES Custom Analytical Engineering Systems VERTIGO INC.

Strong Progress Since Program Start

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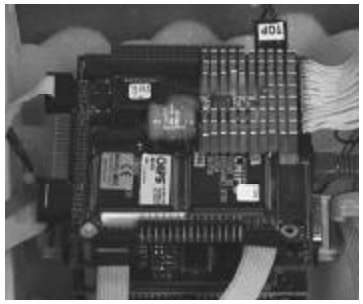
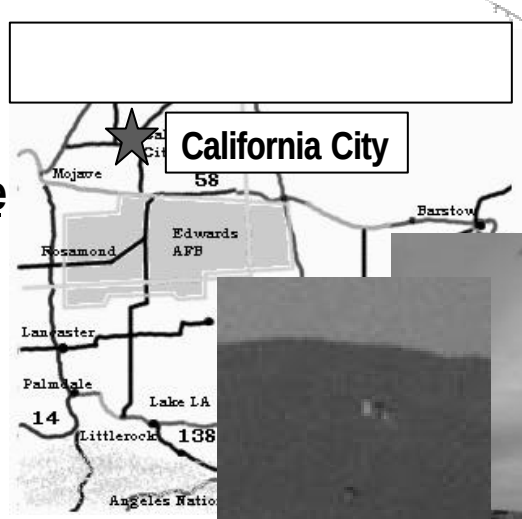
GN&C

- Hardware evaluation to begin in April-01
  - Rockwell NavStrike II GPS delivery May-01
  - Honeywell RLG consignment delivery March-01
  - Testing of PC-104 Flight Computer hardware underway
  - Mod 0 guidance law under development and complete by March-01
  - Mod 0 autopilot under development and complete by March-01



Full-Scale, Powered R/C Flight Vehicle

- **Design Complete** (R/C controls, air data & diagnostic sensors, on-board data acquisition, 2.4 GHz transceiver, COTs engine, CCD camera)
- Fabrication completed November-00
- Integration completed December-00
- Ground test completed by January-01
- Initial Flight Test February-01
- Visible sensor Flight Test February-01



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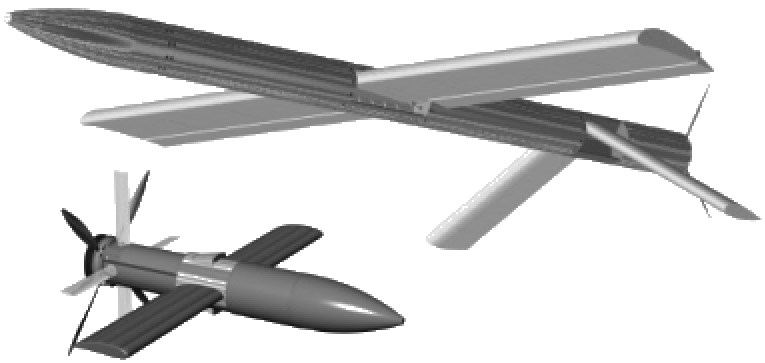
Summary

Artillery Launched loitering munitions provide the following features:



- Low cost
- Expendable
- Quickly deployable
- Organic to early entry forces
- Sensor-to-shooter field artillery responsiveness
- Time Critical Strike (FASM, only)

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